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EXAMINER	
NGUYEN, KHAI MINH	

ART UNIT	PAPER NUMBER
2617	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/967,048	KASAPI, ATHANASIOS A.	
	Examiner	**Art Unit**	
	KHAI M. NGUYEN	2617	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _03 September 2008_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-9 and 11-22_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-9 and 11-22_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 9/3/2008 have been fully considered but they are not persuasive.

Regarding claim 1-9 and 11-22, Applicant argues, on pages 2-4 of the remarks, that Buehrer in view of Boariu do not disclose, teach, or suggest " (1) generating a plurality of sub-carriers to redundantly transmit the information over a multi-carrier wireless communication channel; (2) wherein each of the sub-carriers is to be transmitted over an array of two or more antennas; (3) wherein each of the sub-carriers is modified by a set of complex weights to ensure that each of the sub-carriers of the wireless communication channel propagates along a different physical path to the receiver; (4) wherein the set of complex weights used to modify each of the sub-carriers includes different weights for each of the two or more antenna of the array."

The Examiner respectfully disagrees with Applicant's argument because the current claim language is broad enough to be met by Buehrer in view of Boariu.

Buehrer in view of Boariu clearly disclose:

(1) generating a plurality of sub-carriers (see Buehrer, [0091] for each antenna, the input sequence is split into three streams of data, s1, s2 and s3) to redundantly transmit (see Buehrer, abstract (M different Walsh codes since each transmit signal received contains a component that is the result of M different Walsh codes having been <u>modulated</u> by a data signal associated with that particular mobile)) the

information over a multi-carrier wireless communication channel (see Buehrer, fig.1, [0061]);

(2) wherein each of the sub-carriers (see Buehrer, fig.2, item 202) is to be transmitted over an array of two or more antennas (see Buehrer, antennas 1 and 2);

(3) wherein each of the sub-carriers is modified by a set of complex weights to ensure that each of the sub-carriers of the wireless communication channel propagates along (see Boariu, col.24, line 41 to col.25, line 13) a different physical path (see Boariu, fig.3, items 314, 316, and 318) to the receiver (see Boariu, fig.3, item 322);

(4) wherein the set of complex weights (different Walsh codes/see Boariu, symbols) used to modify each of the sub-carriers includes different weights (different Walsh codes/see Boariu, symbols) for each of the two or more antenna of the array (see Buehrer, [0091] The two modulated signals are then combined in summer 938-1 and transmitted by Antenna 1 as s1(t). As mentioned, s2(t) and s3(t) for Antenna 1 and s1(t), s2(t) and s3(t) for Antenna 2 are formed in a similar manner, see Boariu, col.24, lines 34-37).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-9 and 11-22 are rejected under 35 U.S.C.103(a) as being unpatentable over Buehrer (U.S.Pub-20030081656) in view of Boariu et al. (U.S.Pat-6865237).

Regarding claim 1, Buehrer teaches a method comprising:

receiving information for transmission to a receiver (fig.5); and

generating a plurality of sub-carriers ([0091] lines 19-29) to redundantly (abstract (lines 18-19)) transmit the information over a multi-carrier wireless communication channel (fig.1, [0061]), wherein each of the sub-carriers ([0091] lines 19-29) is to be transmitted over an array of two or more antenna ([0061] antennas 1 and 2), wherein each of the sub-carriers is modified by a set of complex weights (fig.8) to ensure that each of the sub-carriers of the wireless communication channel propagates along a different physical path (not specifically disclose) to the receiver (mobile) (fig8, [0087]), wherein the set of complex weights used (fig.8) to modify each of the sub-carriers includes different weights (fig.8) for each of the two or more antenna of the array ([0091]).

Buehrer fails to specifically disclose ensure that each of the sub-carriers of the wireless communication channel propagates along a different physical path.

However, Boariu teaches ensure that each of the sub-carriers of the wireless communication channel propagates along a different physical path (col.24, line 41 to col.25, line 13).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to teaching of Boariu to Buehrer to reduce bit error rates of a wireless communication in a spread spectrum receiver.

Regarding claim 2, Buehrer and Boariu further teach a method according to claim 1, wherein each element of the set of complex weights scales (see Buehrer, fig.8) one or more of a sub-carriers amplitude and/or phase at an associated transmission antenna (see Boariu, col.24, line 41 to col.25, line 13).

Regarding claim 3, Buehrer and Boariu further teach a method according to claim 1, further comprising developing a set of complex weights including:

choosing substantially different weights (see Buehrer, fig.8), for each sub-carrier sharing information (see Buehrer, [0091] lines 19-29); and iteratively repeating until all sub-carriers have been modified (see Boariu, col.24, line 41 to col.25, line 13).

Regarding claim 4, Buehrer and Boariu further teach a method according to claim 3, wherein the substantially different weights are chosen to be orthogonal to the others (see Buehrer, [0003]).

Regarding claim 5, Buehrer and Boariu further teach a method according to claim 3, wherein developing a set of complex weights comprises: selecting weight vector(s) to be applied to each of the sub-carriers from a pre-determined set of weight vectors (see Buehrer, [0091] lines 19-29).

Regarding claim 6, Buehrer and Boariu further teach a method according to claim 1, further comprising: transmitting the modified sub-carriers (see Buehrer, [0091] lines 19-29).

Regarding claim 7, Buehrer teaches a transceiver comprising:

a diversity agent (not specifically disclose), operable to selectively apply a set of complex weight values (fig.8) to each of a plurality of signals ([0091]), each corresponding to a sub-carrier ([0091] lines 19-29) of a multi-carrier communication channel ([0091]), to introduce spatial diversity between such sub-carriers ([0091]); and

a transmit module (not specifically disclose), operable coupled with the diversity agent (not specifically disclose), to receive the modified sub-carriers ([0091] lines 19-29) and transmit the signals to generate the multi-carrier communication channel (fig.7) with intra-channel spatial diversity ([0087]).

wherein each of complex weight values (fig.8) include a plurality of weight values each associated with a different one of a plurality of antennae (antennas 1 and 2) of an antenna array through which the sub-carriers are transmitted ([0091]).

Buehrer fails to specifically disclose a transmit module, operable coupled with the diversity agent.

However, Boariu teaches a transmit module (fig.3, item 312), operable coupled with the diversity agent (fig.3, col.24, lines 46-62).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to teaching of Boariu to Buehrer to reduce bit error rates of a wireless communication in a spread spectrum receiver.

Regarding claim 8, Buehrer and Boariu further teach a transceiver according to claim 7, wherein the plurality of signals received from at the diversity agent (see Boariu, item 300) are baseband signals (see Buehrer, [0091]).

Regarding claim 9, Buehrer and Boariu further teach a transceiver according to claim 7, wherein the multi-carrier communication channel is comprised of a plurality of sub-carrier signals (see Buehrer, [0091]), each having a disparate set of complex weights introduced at a baseband of the sub-carriers to effect the spatial diversity between the sub-carriers (see Boariu, col.24, line 41 to col.25, line 13).

Regarding claim 11, Buehrer and Boariu further teach a transceiver according to claim 7, wherein the transceiver is operable to develop the set of complex weight values for a given baseband signal to be maximally orthogonal complex weight values applied to another baseband signal (see Buehrer, [0091]).

Regarding claim 12, Buehrer and Boariu further teach a transceiver according to claim 7, wherein the transceiver is operable to develop a set of complex weight vectors for a sub-carrier (see Buehrer, [0091]) that are substantially different from weight vectors modifying other sub-carriers that include at least a subset of information carried by the sub-carrier (see Buehrer, fig.8, [0091]).

Regarding claim 13, Buehrer and Boariu further teach a transceiver according to claim 7, wherein the transmit module is operable to upconvert and amplify each of the modified baseband signals to generate a plurality of spatially diverse sub-carriers (see Buehrer, [0096], see Boariu, col.25, lines 18-32).

Regarding claim 14, Buehrer and Boariu further teach a transceiver according to claim 13, wherein the transmit module operable to transmit each of the sub-carriers to one or more receiver(s) (see Boariu, col.24, line 41 to col.25, line 13).

Regarding claim 15, Buehrer teaches a transceiver according to claim 7, further comprising: a memory operable to store content (see Boariu, col.25, lines 33-48); and control logic, coupled to the memory (see Boariu, col.25, lines 33-48), operable to access and process at least a subset of the content to implement the diversity agent (see Boariu, col.25, lines 33-48).

Regarding claim 16, Buehrer and Boariu further teach the method of claim 1, wherein the multi-carrier wireless communication channel uses Orthogonal Frequency Division Multiplexing (OFDM) (see Boariu, col.12, lines 44-49).

Regarding claim 17, Buehrer and Boariu further teach the transceiver of claim 7, wherein the multi-carrier communication channel uses Orthogonal Frequency Division Multiplexing (OFDM) (see Boariu, col.12, lines 44-49).

Regarding claim 18, Buehrer and Boariu further teach the transceiver of claim 7, wherein the transceiver is selected from a base station and a wireless telephony subscriber unit (see Buehrer, [0087]).

Regarding claim 19, Buehrer and Boariu further teach the transceiver of claim 7, wherein the transceiver develops the set of complex weights (see Buehrer, fig.8) to have inter-channel spatial diversity (see Buehrer, [0091])) with respect to at least one communication channel of at least one other transceiver (see Buehrer, fig.7).

Regarding claims 20 and 22, Buehrer teaches a subscriber unit comprising:

a diversity agent (not specifically disclose), operable to selectively apply a set vector of complex weight values (fig.8) to each of a plurality of signals ([0091]), each corresponding to a sub-carrier ([0091] lines 19-29) of a multi-carrier communication channel ([0091]), to introduce spatial diversity between such sub-carriers ([0091]); and

a transmit module (not specifically disclose), coupled with the diversity agent (not specifically disclose), operable to receive the modified sub-carriers (fig.8) and transmit the signals to generate the multi-carrier communication channel (fig.7) with intra-channel spatial diversity ([0087]).

wherein the vector of complex weight values (fig.8) applied to each signal includes a plurality of different complex weight values ([0091] lines 19-29]), and wherein each of the different complex weight values (fig.8) is operable to modify both an amplitude and a phase of a respective signal (fig.8, [0067], [0091] lines 19-29)

Buehrer fails to specifically disclose a transmit module, operable coupled with the diversity agent.

However, Boariu teaches a transmit module (fig.3, item 312), operable coupled with the diversity agent (fig.3, col.24, lines 46-62).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to teaching of Boariu to Buehrer to reduce bit error rates of a wireless communication in a spread spectrum receiver.

Regarding claim 21, Buehrer and Boariu further teach a transceiver according to claim 7, wherein each of the set of complex weight values are comprised of a plurality of weight values each (see Buehrer, fig.8) associated with one of a plurality of antennae (see Buehrer, antennas 1 and 2) comprising an antenna array through which the sub-carriers are transmitted (see Buehrer, [0091]).

Conclusion

3. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KHAI M. NGUYEN whose telephone number is (571)272-7923. The examiner can normally be reached on 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vincent P. Harper can be reached on 571.272.7605. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/VINCENT P. HARPER/
Supervisory Patent Examiner, Art Unit 2617

/Khai M Nguyen/
Examiner, Art Unit 2617 12/2/2008